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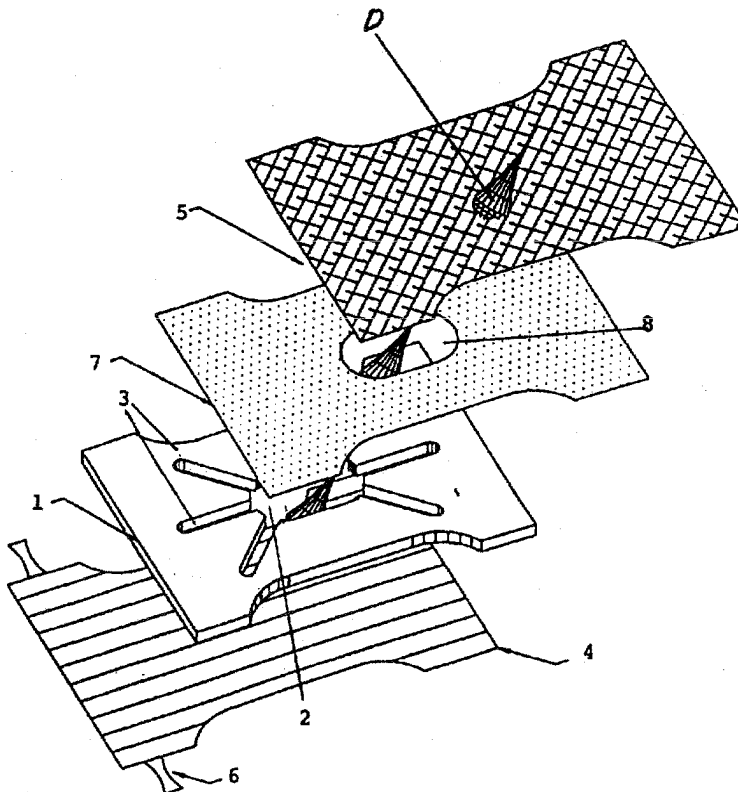
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(57) Abstract

The invention relates to a diaper of the kind including outer and inner layers enclosing an absorbing layer, an absorbing body or the like, wherein at least one recess is arranged in the absorbing layer and a liquid passage in line with said recess at the inner covering layer. The novelty lies therein that besides the recess in the absorbing layer there are a number of channels extending from the recess forming together with the recess a storage space defined by the outer and inner layers of the diaper for temporary reception of liquid not yet absorbed and an extended liquid absorbing edge surface.



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DIAPER DEVICE

This invention relates to diapers especially for infants, but also for incontinence protection and napkins and more in details to the type of diapers including at least one at least
10 partly moisture tight enclosing layer and one or more inner layers having a good absorption ability.

Background of the invention

There are known different ways of controlling the absorption
15 of liquid in the absorbing layer.

SE 400 459 discloses a disposable diaper wherein an absorbing layer is provided with a number of through openings. The absorbing layer is freely arranged relating to a tight rear
20 or outside layer and is covered by a moisture permeable inner or forward layer. The idea with this is that moisture will be able to pass through the inner layer simultaneously as it is partly absorbed, pass through the through openings towards the rear of the absorbing layer in order to, aided by the tight
25 outside layer be distributed or spread over the absorbing layer.

DE 3 426 897 discloses another solution of a similar kind. It includes a tight outer or rear layer, an absorbing filling and
30 an inner layer and also in this case the absorbing layer is provided with one or more through openings. The inwardly facing covering layer is double and includes a first tight layer having holes corresponding to those of the absorbing layer and an outer layer of non-woven material. The intention hereby is
35 to gain the advantage that liquid can be spread on the non-woven material in order to eventually reach the position of any of the openings and pass through the non-woven material and through any of the holes in the tight foil layer to reach the

openings of the absorbing layer so that the moisture can be absorbed essentially through the edges of the latter openings.

Common features of the known constructions are that they in spite of the increase of the absorption area by the holes or openings provided and the passages arranged at the inner layer are unable to take care in a desired and intended way of concentrated volumes of liquid within a limited area, the result being that the liquid is distributed over the entire inside of the diaper and easily leaks out at the edges. It also occurs that liquid in free state fills one or any of the openings of the absorbing layer and to oversaturation fills the adjoining absorption material portions whereas the rest of the absorbing layer is unutilized and only eventually will take in the absorption. Local oversaturation of the absorbing layer will result in leak risks back towards the carrier or laterally at the edges.

It has been established that at known constructions the absorbing ability of the absorbing material is poorly taken advantage of. An estimation discloses that only about half of the material is used which means that half of it is disposed of unused. One reason behind the faulty effect seems to be that once the material absorbs liquid, it has a tendency to compact and form clods and this prevents the liquid from spreading. One reason behind this tendency to form lumps or clods is that the material consists of long and short fibres. The movements of the user result in separation of the fibre material so that the continuous layer or body of fibre material disintegrates into smaller gatherings or lumps of fibres. The gaps or cracks formed between the separate gatherings or lumps make the intended distribution of liquid over the entire absorbing layer or body impossible which results in local oversaturation and leaking in spite of the fact that only a fraction of the capacity of the material has been taken advantage of.

Purposes of the invention

One essential aspect of the invention is to bring about a diaper or the like which is so arranged that it has an improved ability to absorb and keep liquid and moisture without leaking and more in detail a diaper where the absorbing material is utilized to a high degree in order to reach this high absorption ability.

Another aspect of the invention is to conceive a diaper having the ability to temporarily store liquid in free state before its absorption.

Another aspect is to improve the function of a diaper by keeping the absorption material in its place.

One more aspect is to minimize the leak risk resulted by local oversaturation of the absorption material.

Still another aspect is to increase the absorption area without reducing the total absorption capacity and a quicker absorption with a reduced amount of absorption material and also a reduction of the cost.

As a result of the reduced amount of absorbing material the demand to use biodegradable, i.e. compostable, material at a price not exceeding the current price of diapers is met.

A final aspect is also to bring about a diaper comfortable to wear and which presents a dry inner face towards the user also after having absorbed liquid.

Summary of the invention

Behind this invention lies the idea to maximize the available absorption surface without reduction of the effective absorbable volume of liquid by arranging at least one appropriately shaped recess in the absorbing material and by at least partial covering of outer or peripheral portions of the recess by not permeable or limited permeable material define

pocket like chambers for temporary storing of liquid in free state awaiting absorption.

Description of embodiments

- 5 The invention will be described in the following with references to the attached drawing, in which

Figure 1 diagrammatically illustrates the course of events on discharge of a volume of liquid at a diaper or the like having
10 an absorbing layer,

Figure 2 in an exploded view shows the components included in a first embodiment of a diaper according to the invention,

- 15 Figure 3 in the same way as Figure 2 shows the components included in a modified embodiment of the diaper according to the invention,

Figure 4 in the same way as Figures 2 and 3 shows the
20 components included in a preferred embodiment of the diaper according to the invention.

Time is indicated along the X axis and the magnitude of the flow along the Y axis. The flow of liquid is indicated by the
25 curve U commencing at 0 whereas the ability to absorb is marked by the dash line A. During an initial period of time the liquid will be fully absorbed but on increase of the flow beyond a certain amount there occurs an excess, the hatched area S
30 representing a volume of liquid in free state on the surface of an absorbing layer or body. As the flow eventually decreases the absorbing material is again able to take care of and absorb the liquid as can be seen at the right hand part of the curve U.

- 35 A basic problem hitherto not solved is to arrange for temporary of the partial volume which cannot be taken care of immediately and prevent it from leaking out laterally or otherwise along the diaper.

According to this invention there is in the absorbing layer or body 1, preferably at the center thereof arranged at least one slightly elongated recess 2 from the edges of which narrow
5 branch cannels 3 extend in different directions outwardly from the recess 2.

Further, there is, on the one or outer face of the absorbing layer 1 arranged an essentially moisture and/or liquid proof
10 layer 4, which can be a separate barrier layer outside include a coating in an appropriate way attached to an outer layer or lining of non-woven material or the like provided at the absorbing layer. On the opposite or inner side of the absorbing layer there is a layer or lining 5 which is permeable for
15 liquid at least in an area or areas localized essentially in line with the at least one recess 2 in the absorption layer 1, said layer or lining also being constituted by non-woven material or the like.

20 In Figs. 2-4 a drop D illustrates a volume of liquid to be caught by the diaper. Fig. 2 shows how the volume of liquid can pass through the permeable portion of the inner layer or lining 5 and be caught in the recess 2.

25 After having joined the different layers along their edges, the outer layer 4 will form a tight bottom for the recess 2 simultaneously as the inner layer 5 forms a permeable cover over the same. By arranging the elongated recess 2 and above all the channels 3 branching out from it a trapping area and
30 cavity having an extremely long edge length is created. The total length of the edges defining the recess and the channels, respectively, form an efficient absorption surface and the extension thereof is decisive for the absorption ability and speed. Free liquid entering the recess and flowing out therein
35 and into the branch channels will meet a very long contact surface which facilitates and speeds up the absorption. The increase of absorption area gained by arranging the branch channels, is decisive for the ability to store, i.e. the

ability to temporarily take care of an excess of arriving liquid not immediately absorbable.

- At conventional circular recesses or openings made in the absorbing layer the area of absorption is equal to the face of the edge defining the recess. An addition of liquid filling the recess can be absorbed only as fast as the material adjoining the recess manages to forward and take care of the liquid. The excess liquid normally distributes itself over the face of the diaper and seeps out at the edges. By combining the recess with channels or branches extending therefrom, the edge surface ensuring the absorption will be multiplied and also the speed of absorption. An arriving volume of liquid will be distributed and quickly absorbed over a large area. A similar effect cannot be reached by arranging several recesses close to each other, as there is no communication between the recesses and excess amounts of liquid will have to flow along the surface of the diaper in order to reach one hole or the other close by.
- Scattered or detached holes or recesses lack the ability to distribute the liquid over larger areas, whereas the combination of recess and channels suggested now can ensure utilization of the entire volume of absorbing material.
- In the embodiment according to Fig. 2 there is a non-woven type inner layer 5 with or without moisture penetration preventing cover. The outer layer 4 may also be of non-woven type but has a cover or layer preventing moisture penetration. At the same layer there are strips of adhesive tape or the like 6 for the fastening of the diaper.

- In the embodiment according to Fig. 3 the single inner layer 5 is completed with a barrier layer 7 forming a moisture barrier inside the non-woven layer 5. In the area adjacent the recess 2 of the absorption layer 1 there is an opening 8 having essentially the same area as the recess 2. A flow of liquid meeting the inner layer 5 at the recess 2 thus can pass directly into the recess 2. Each of the branch channels 3

covered by the barrier layer 7 forms an inwardly and outwardly covered pocket opening into the recess and in such chambers excess volumes may be temporarily stored until absorption takes place without any leak risk.

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At some distance from the position of the recess 2 and the opening 8, respectively, the embodiment according to Fig. 4 there is an additional preferably annular area permeable to liquid in order to prevent that some liquid reaching the inner
10 layer 5 remote from the opening 8 flows out and possibly leaks out at the edges of the diaper. In Fig. 4 can be seen how the barrier layer 7, which can be constituted by a coating on the non-woven layer 5, besides the opening 8 is provided with an outer surrounding opening 9. The inner barrier layer portion 7
15 around the opening 8 ensures the storing function of the storing channels 3 and an outer barrier layer portion 7" covering the area along the edge of the diaper and prevents squeezing out of liquid there. The surrounding opening may naturally be replaced by several smaller openings arranged
20 essentially in the same way.

The embodiment according to Fig. 4 results not only in an efficient trapping of volumes of liquid entering the intended central area around the recess 2 but also liquid which - e.g.
25 because of displacement of the diaper - meets the surface remote from the recess. In such cases the ability to temporarily store free liquid will be reduced as only the outer ends of the channels 3 and not the recess 2 will be reached immediately. This drawback is, however, clearly
30 compensated by the increased general ability to catch liquid also outside the normally intended area.

The diaper arranged according to the invention is preferably manufactured by biologically degradable material. Thus, the
35 non-woven layers may be manufactured by viscose material, the absorbing layer as before by cellulose products and the barrier layers or covers by wax products on a natural basis or by other biodegradable barrier materials available on the market.

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C L A I M S

1. Diaper or the like hygienic product including an outer layer (4) essentially impermeable for liquid, an inner layer (5) at least partially permeable and an absorption layer or absorption body (1) between the two said layers, wherein the absorption layer (1) presents at least one recess localized at an permeable portion of the inner layer, characterized by that the recess arranged in the absorption layer or body (1) includes a central portion (2) and a number of channels (3) extending from the edge of the recess in different directions the length of the channels being adapted to the distance from the edge of the recess to the outer edge of the absorption layer, that the recess and/or the channels (3) extending therefrom has a depth corresponding to at least part of the thickness of the absorption layer or body (1) and that the channels (3) together with the recess (1) form between the outer impermeable layer (4) and the inner layer (5) a defined storage space for temporary storing of liquid in free state awaiting absorption.

25

2. Diaper according to claim 1, characterized by that the layer (5) inwardly covering the absorption layer or body (1) presents a portion permeable to liquid in an area essentially corresponding with the area of the recess (2) of the absorption layer or body and areas impermeable to liquid covering at least a portion of the length of at least some of the channels (3) extending from the recess.

30

3. Diaper according to claim 1 or 2, characterized by that to the layer (5) inwardly covering the absorbing layer or body (1) is added a liquid barrier layer (7) having an area or opening (8) in a position essentially corresponding to the position of the recess (2)

35

of the absorption layer.

4. Diaper according to claim 3, c h a r a c t e r i z e d
by that there is besides the liquid permeable area or opening
5 (8) essentially opposite to the recess (2) outside a liquid
barrier portion covering at least part of the length of the
channels (3) one or more liquid permeable areas or openings,
forming liquid permeable zones remote from the opening opposite
the recess.

10

5. Diaper according to any of the preceding claims,
c h a r a c t e r i z e d by that there is between the liquid
permeable layer facing the user and the absorption body or layer
(1) a liquid permeable layer of non-woven material or the like
15 stabilizing the absorption material, and secured to the outer
liquid impermeable layer (4) at the recess (2) and/or the
channels (3).

6. Diaper according to any of the preceding claims,
20 c h a r a c t e r i z e d by that the inner and the outer
layers and the absorbing layers are made of biologically
degradeable materials, e.g. on a viscose or cellulose base
and that the barrier layers preferably having coatings of
biologically degradeable materials preferably natural waxes
25 or the like.

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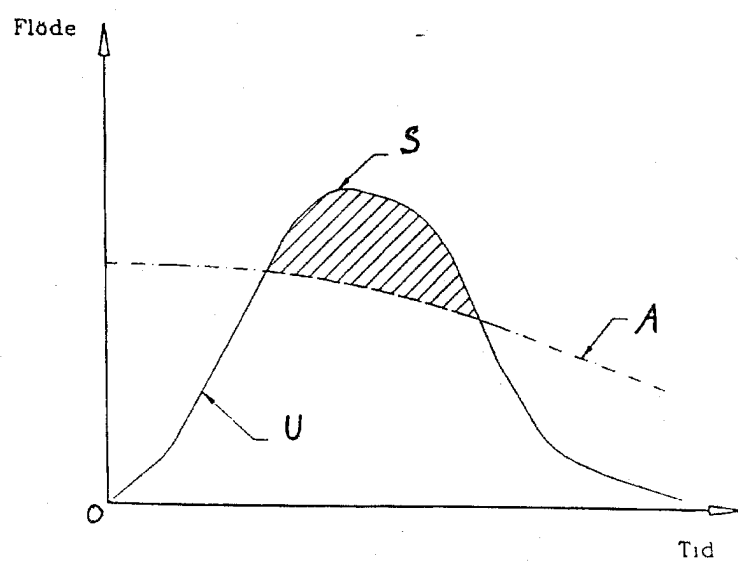


FIG. 1

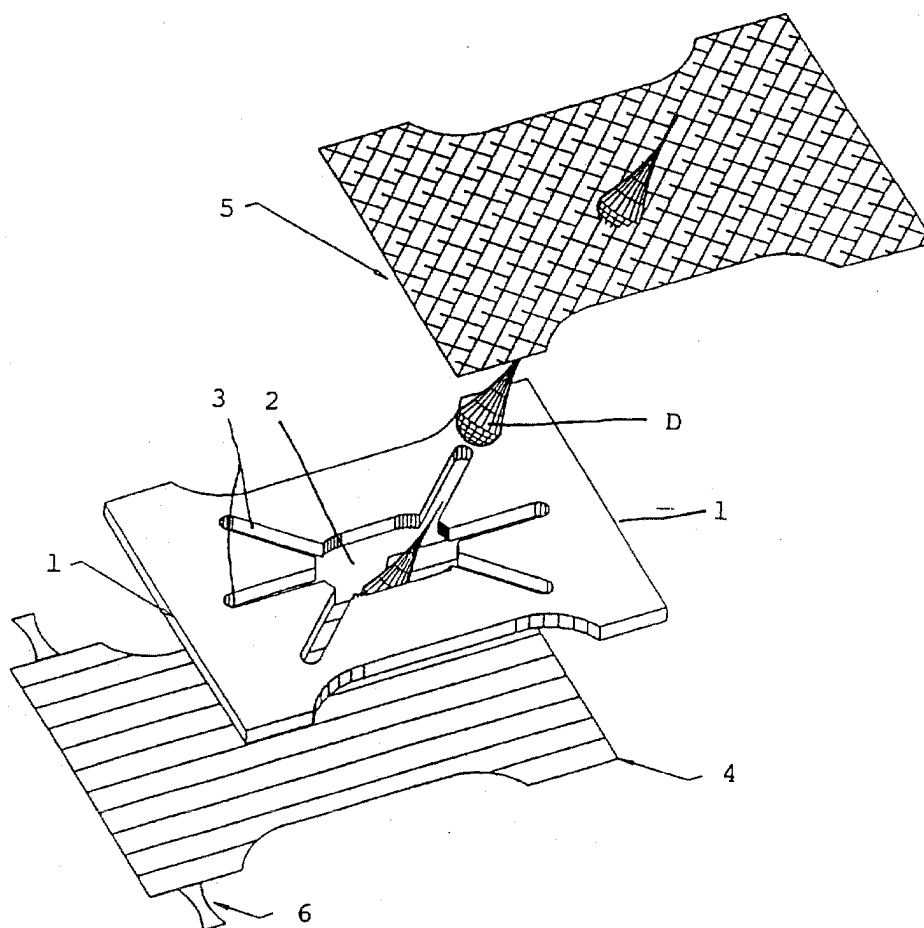


FIG. 2

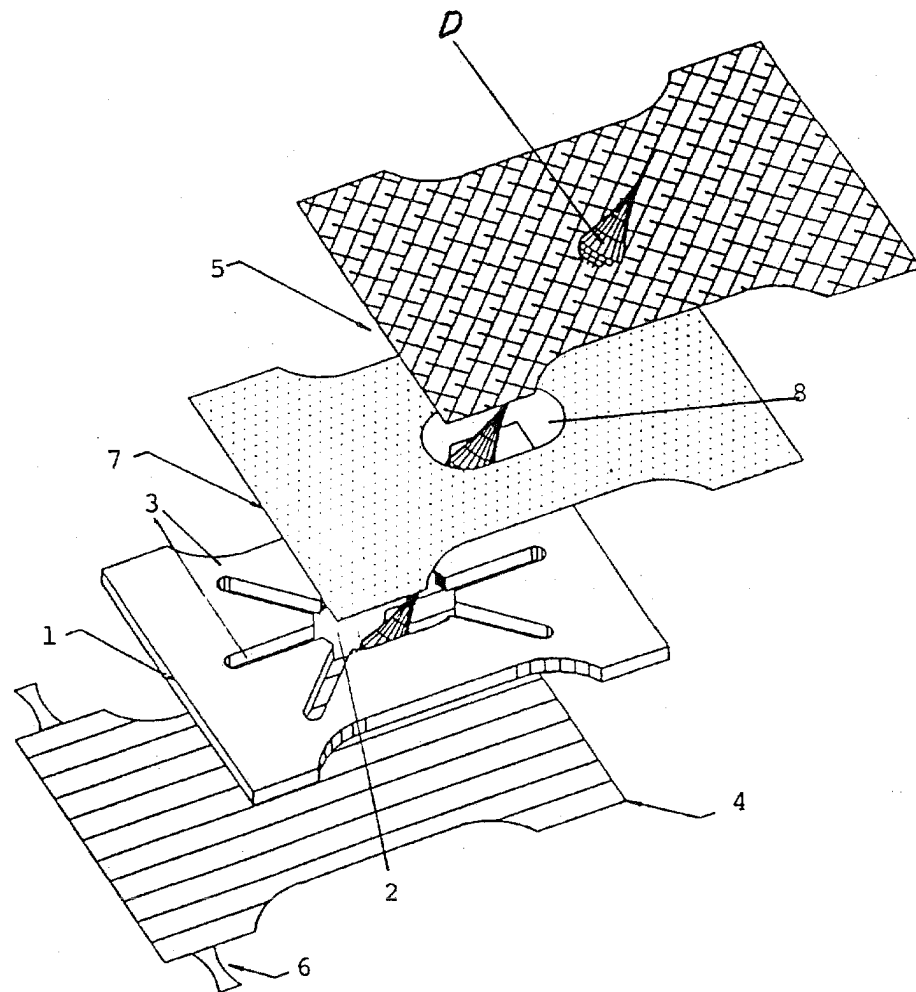


FIG. 3

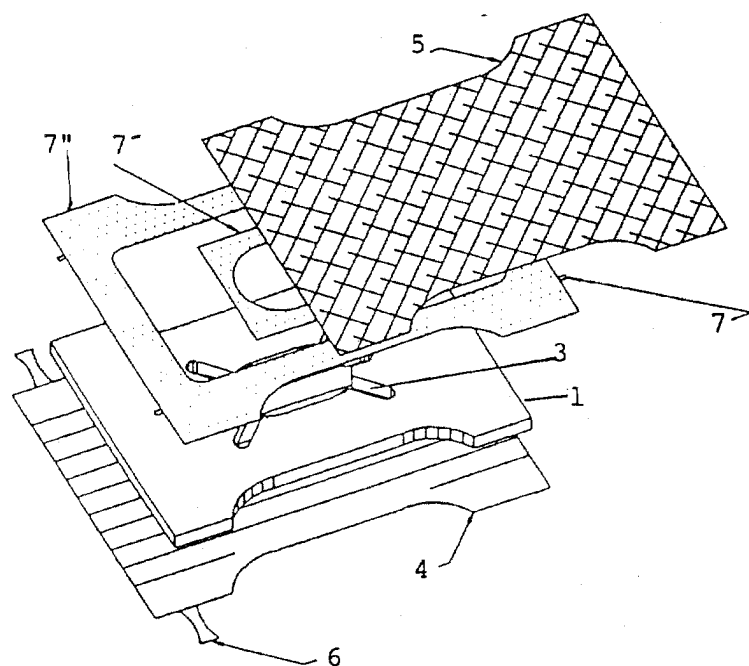


FIG. 4

INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 95/01222

A. ASSIFICATION OF SUBJECT MATTER		
IPC6: A61F 13/15 According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED		
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Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
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C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5300053 A (D.M. GENARO), 5 April 1994 (05.04.94) --- -----	1-6
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